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(71) Applicants
Yugen-Kaisha Ito Selsen-Kojo

(Incorporated in Japan)

**No. 1729, Oaza Sakata, Okegawa-shi,
Saltama-ken, Japan**

Kabushiki-Kaisha Ito Selsenbu-Honten

(Incorporated in Japan)

No. 2-23-6, Amagasuka Yokkaichi-shi, Mie-ken, Japan

(72) Inventors
**Hideaki Ito
Haruo Ito**

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(74) Agent and/or Address for Service
**Stevens Hewlett and Perkins
5 Quality Court, Chancery Lane, London,
WC2A 1HZ, United Kingdom**

(54) **Method for the manufacture of snack foodstuffs**

(57) A method for the manufacture of snack foodstuffs containing rice, barley, wheat, millet or potato as the main ingredient, together with other auxiliary ingredients and additives comprises adding water to the main ingredients, auxiliary ingredients and additives, and agitating the mixture while injecting high pressure steam. The material is then passed through rollers so as to form a sheet, dried and cut or punched into the desired shape. If necessary, the resultant material can then be subjected to further processing to form the final product.

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FIG. 1

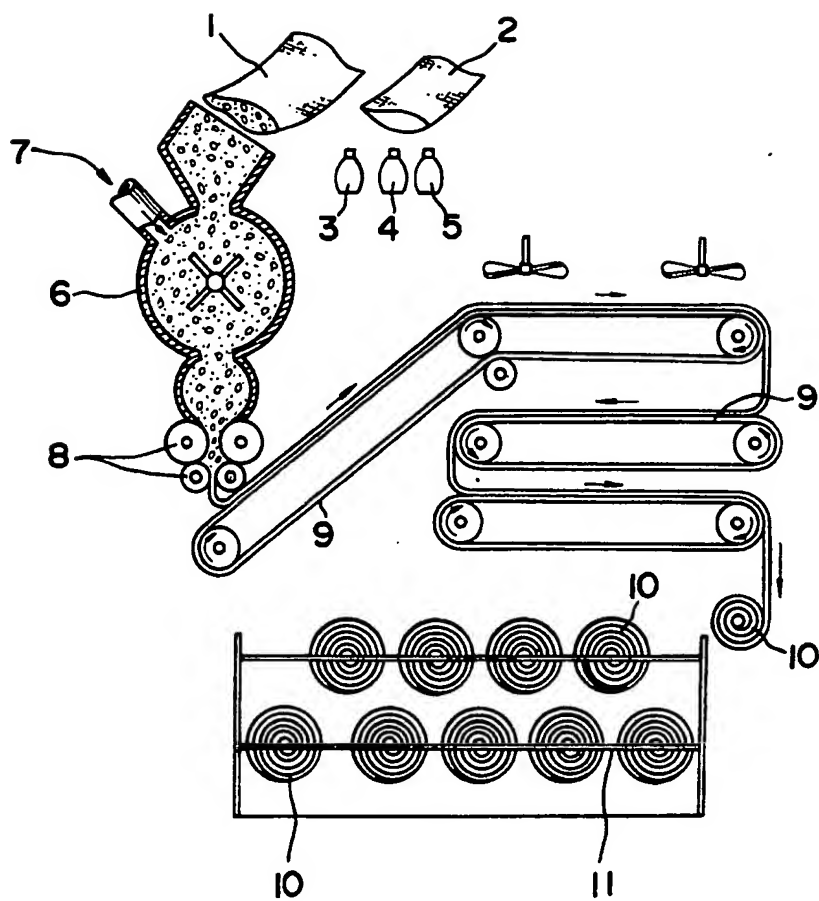
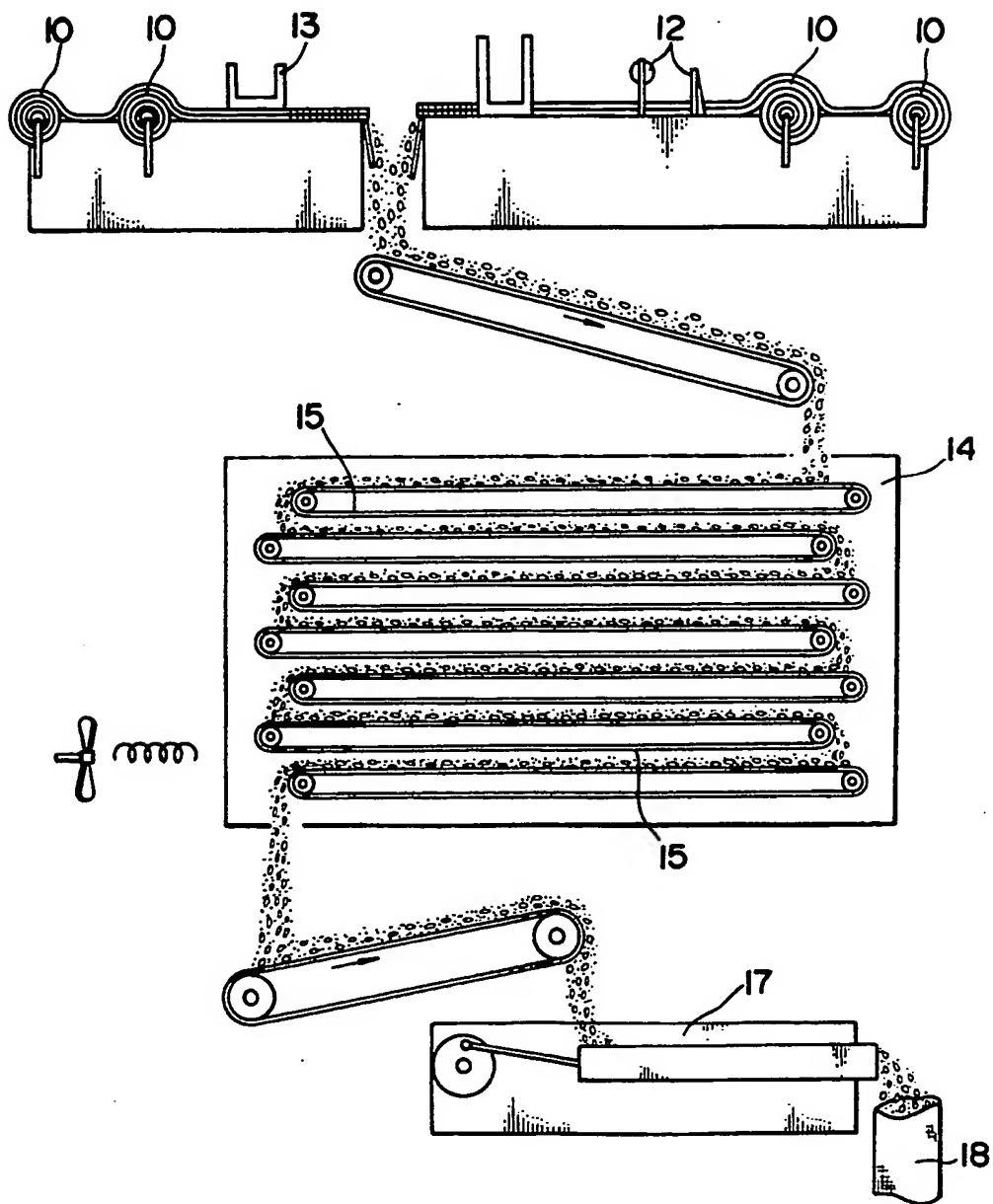


FIG. 2



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FIG. 3

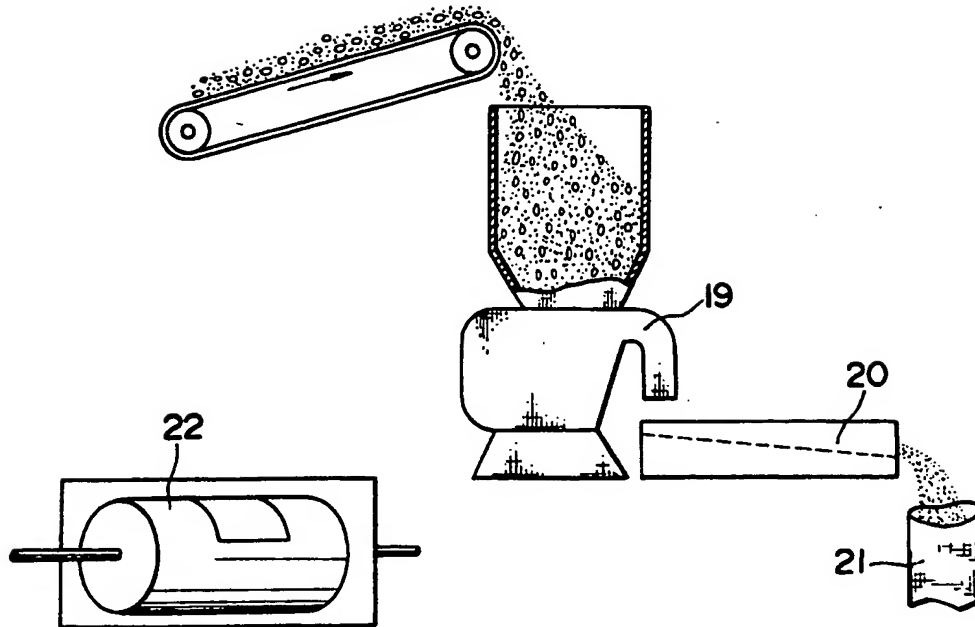


FIG. 4

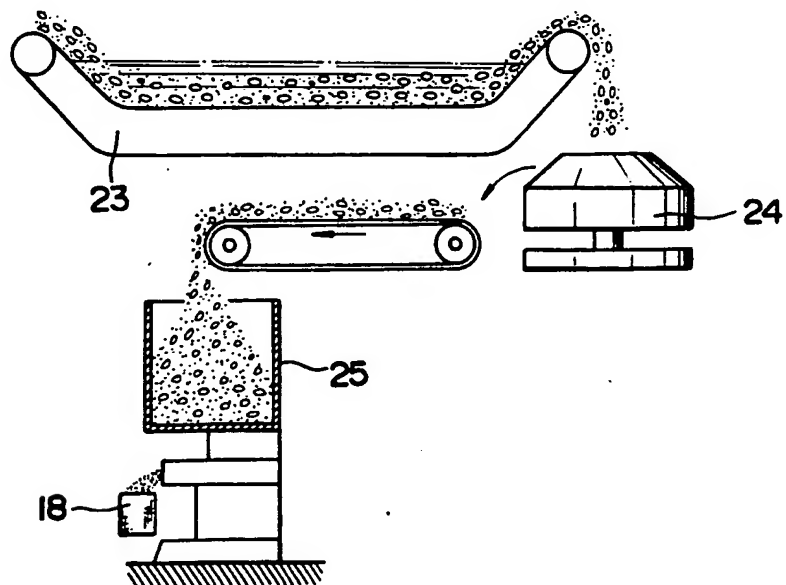


FIG. 5

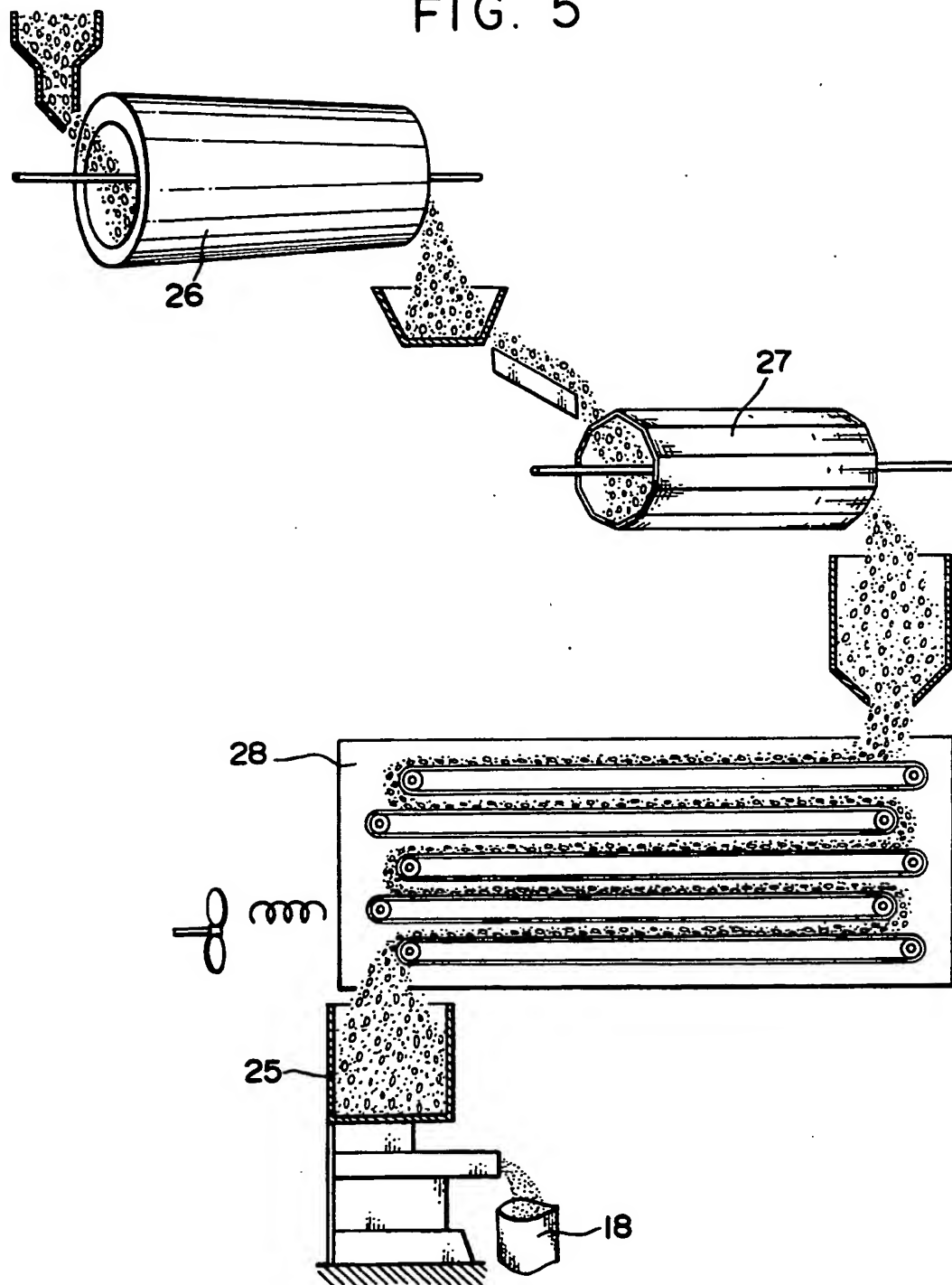


FIG. 6

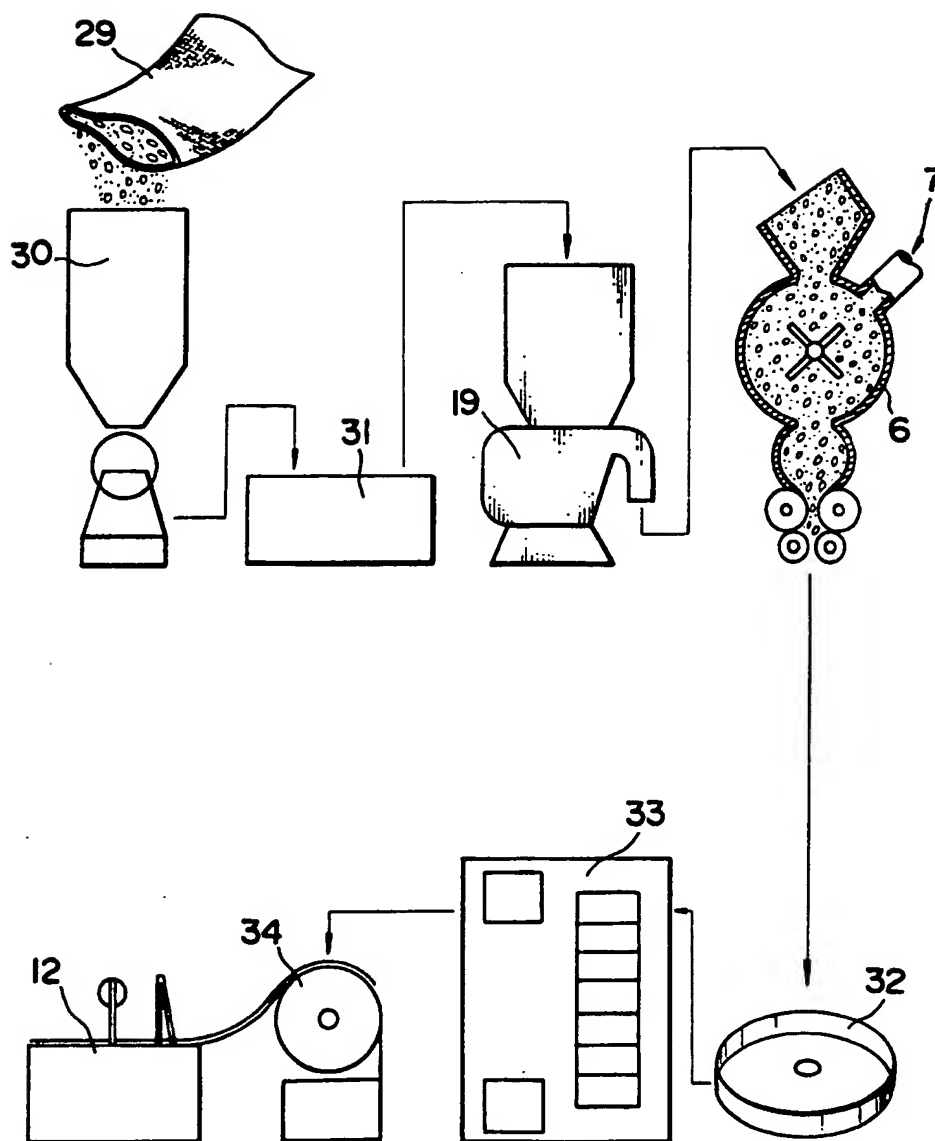
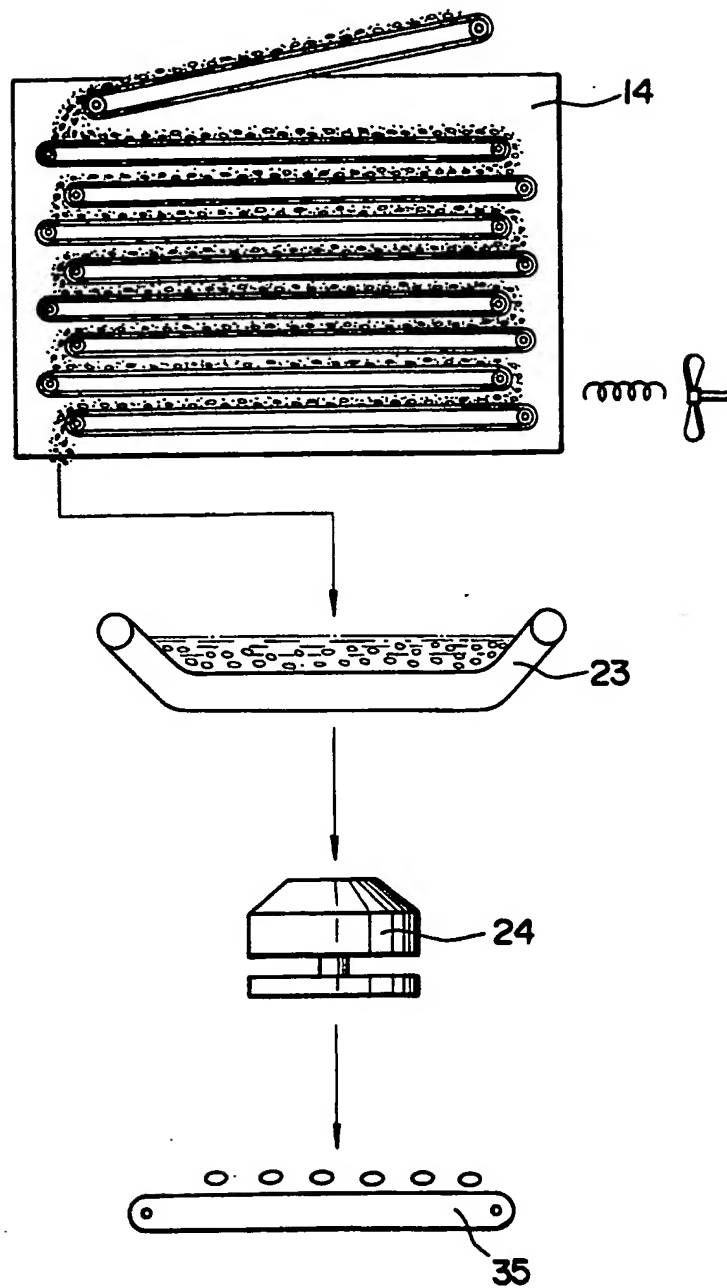


FIG. 7



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FIG. 8

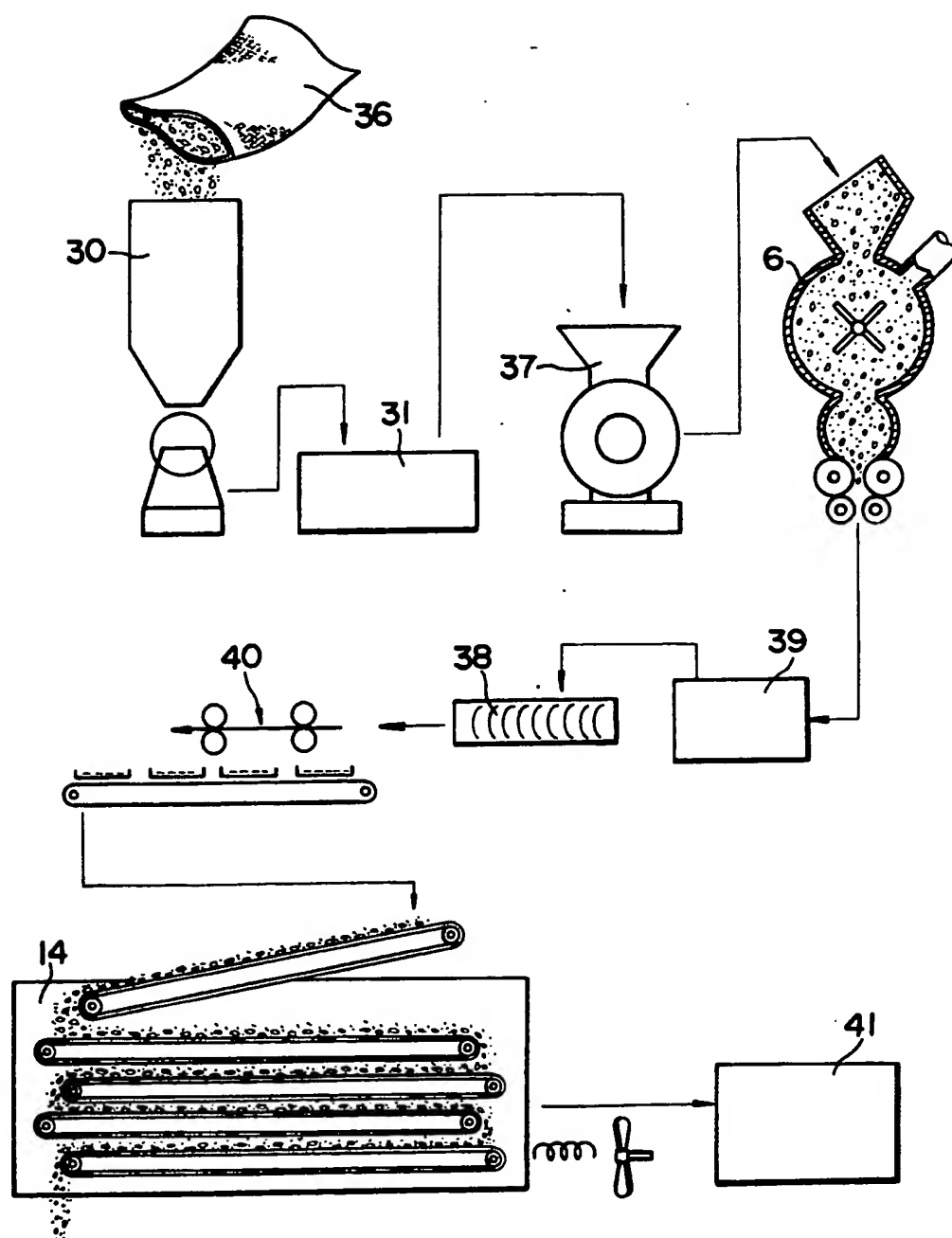
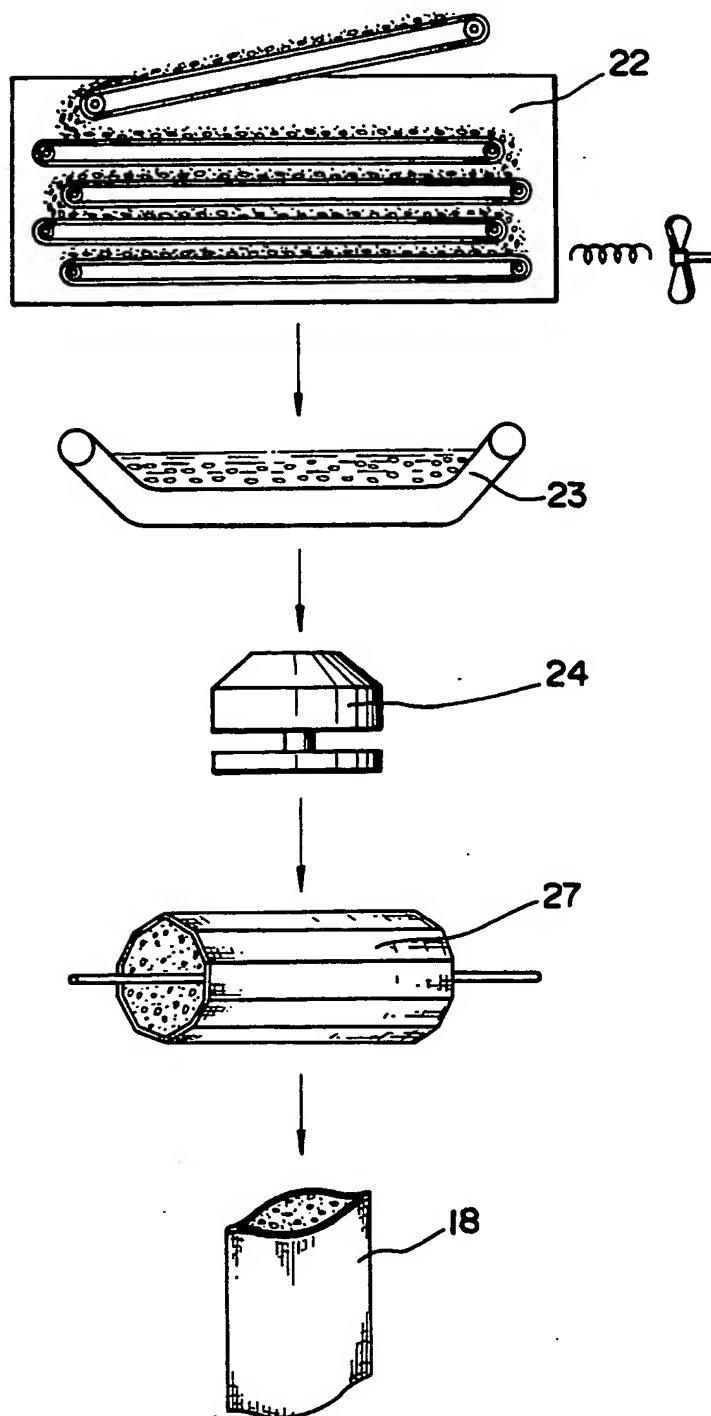


FIG. 9



Method for the Manufacture of Snack Foodstuffs

This invention is related to the automatic mass production method of snack foodstuffs which are rather light and nice smelling, eaten between meals or like relish for liquors, and helps promote appetite. It can produce snacks in a short period of time without wasting time, and the product can be preserved for a long period of time without softening or causing decay easily.

In other words, in this invention, the starch of rice, barley, wheat, millet, potato, etc. is used as the main ingredient, and to the auxiliary ingredients such as pulverized foodstuff containing protein or its powder, starch, beans, sesame, and fishery products, additives such as colorant, blowing agent, spices, flavoring are added, and to this semi-processed material, water or hot water is

added, then while ejecting high pressure steam. agitation is done by changing the number of revolution (rpm) in accordance with the formation degree of gluten in the main ingredient, and cooking, kneading, and conversion into alpha starch is advanced to obtain a rice cake like pasty substance. This is then put through the rolls and pressed into sheets and pre-drying is done. Subsequently, the sheets are cut or punched out to form adequate shapes for respective applications, and transferred to the main dryer, or the thin rice cake like substance pressed by the rolls are dried, then crushed to make granular forms. In this way, the invention consists of the process to make the semi-processed material, and the process to manufacture the snack by roasting, steaming, frying, etc.

(Brief Description of Drawings)

In explaining the details of this invention, first of all, if a brief explanation of the attached drawings is made, it will be as follows:

Fig. 1 is a partial cross section front view which shows the first half of the No. 1 process for manufacturing the kneaded stock for rice cake cubes and millet-and-rice cake from the raw materials.

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The main ingredients, auxiliary ingredients, additives, hot water, etc. are mixed, and steam-kneaded in the steam kneader. Subsequently, the kneaded stock is passed through the compression rolls and made into sheets, then placed on the conveyor, and while it is undergoing pre-drying it is rolled up.

Fig. 2 shows a partial cross section front view of the latter part of No. 1 process where subsequent to the process shown in Fig. 1, the semi-processed material for the diced rice cake that underwent pre-drying is cut, punched out, and sent to the dryer where they are dried by hot air, then packed into bags.

Fig. 3 is a partial cross section front view showing the latter half of the No. 1 process as a separate process in which the materials dried by hot air in Fig. 2 are crushed and carefully sorted out to make raw semi-processed material for snack foodstuff and packing them into bags as raw materials for snack food-stuff.

Fig. 4 is a partial cross section front view showing as secondary process in which the foodstuff stock manufactured by the primary process is fried in oil, and packed in bags as diced rice cake.

Fig. 5 is a partial cross section front view of the

process showing a separate No. 2 process from that shown in Fig. 4, and after secondary drying, flavor is added by the flavor adding machine, then after it is dried by the finishing dryer, it is packed in bags.

Fig. 6 is a process in which glutinous rice is put into rice cleaning machine, and after immersing the rice in water washing immersion tank, it is put into a pulverizer, then steam kneaded in a steam kneader, and after placing it in a solidifying vessel, it is put into a refrigerator. Subsequently, it is shaved by shaving machine and cut by a cutter.

Fig. 7 shows a process subsequent to Fig. 6 where the cut materials are dried in a heat dryer, fried in an automatic frying machine, put into the centrifuge to remove excess oil, then put into a cooling unit to remove heat and make fried diced rice cakes.

Fig. 8 shows a process in which unpolished unglutinous rice is put into a rice polishing machine, then after immersion in the water washing immersion tank, it is made into flour by the flour grinder.

Subsequently, the flour is put into a steam kneader, then after passing through the cooling vessel, it is kneaded by the kneader and made into strips by the compression rolls.

Next, this is cut, shaped, and dried in the No. 1 dryer. Subsequently, the semi-processed material is put into a maturing box and made into a matured semi-processed material by letting it sit. In this way, it shows the process in which the semi-processed material.

In Fig. 9, the manufacturing method in which the semi-processed material in the process shown in Fig. 8 is dried again in the dryer, fried in oil by the automatic drying machine, then removed of excess oil by centrifuge, flavored in the flavoring machine, and sold, are shown.

(Detailed Description of the Invention)

An actual execution example of this invention will be explained by diagram.

As shown in Fig. 1, charge 25 Kg of Wheat (1), 2 ~ 5 Kg of Starch Powder (2), 200 g of Salt (3), 250 g of Blowing Agent (4), 100 g of Flavoring (5), and 15 l of Hot Water into the Steam Kneader (6).

Inject high pressure steam (7) of $3.5 \sim 4 \text{ Kg/cm}^2$ into the Steam Kneader (6) for 3.5 ~ 4 minutes, and conduct agitation by turning the agitator blade at 180 ~ 300 rpm. In this way, aim at making alpha starch.

Subsequently, pass through rolls (8), and roll to the specified thickness and width.

Put the immature semi-processed material that has been rolled up by winder 10 via the chain conveyor (9) on the pre-drying shelf (11) for 10 to 12 hours, and make the semi-processed material mature by letting it sit.

Next, as shown in Fig. 2, cut the semi-processed material lengthwise and width-wise with a cutter (12) or punch out with press type punching machine (13), then place it on the belt (15) at the side of the hot air dryer (14) which is heated by heavy oil heat source or steam heat source, and conduct primary drying at a temperature of 60 ~ 80°C for 4 ~ 6 hours.

Subsequently, the hardened semi-processed material is put into an assorting machine (17) and assorted, and packed in bags (18) as semi-processed material.

In addition, as shown in Fig. 3, there are cases in which the semi-processed material dried by primary drying is put into a pulverizer (19) and crushed, then assorted by the assorting machine (20), and made into raw materials (21) for snack foodstuffs.

Furthermore, in case colored semi-processed material, sesame, laver, kelp, shrimp, small fishes, animal proteins, etc. are mixed into the aforementioned diced cake semi-processed material, these substances are incorporated by

stopping the steam kneading in the previous process where wheat (1), starch (2), salt (3), blowing agent (4), flavorings (5), and warm water are charged to the steam kneader (6), then after charging the aforementioned colored semi-processed material, sesame, laver, etc., the steam kneading is resumed again. Next, in the secondary process, as shown in Fig. 4, the snack foodstuff semi-processed material is made in the secondary dryer (22) at a temperature of 60 ~ 80°C for 8 ~ 12 hours, then fried in oil by the automatic frying machine (23) at a temperature of 180 ~ 250°C.

Subsequently, the excess oil is removed by the centrifuge (24) and the diced rice cake is packed in bags (18) while weighing with an automatic scale (25), or as shown in Fig. 5, after drying in a secondary dryer (22) and roasting in a roaster (26), it is made to pass through flavoring machine (27), and after passing it through the finishing dryer (28), it is weighed by the weighing scale (25) and packed in bags (18).

As for Execution Example No. 2, as shown in Fig. 6, the glutinous rice (29) is put into a rice cleaning machine (30) and the seed skin is removed. Next, it is immersed in water cleaning immersion tank (31), and cleaned as well as having water soak into it. After drainage, put the rice

into the pulverizer (19) and pulverize it.

To 110 Kg of this pulverized rice, add 900 g of salt (3), some flavoring (5), and 40% of warm water, then charge them to the steam kneader (6).

Inject high pressure steam (7) of 0.5 Kg/cm^2 to the steam kneader (6) for 12 ~ 13 minutes, then agitate them by revolving the steam kneader blades at about 50 ~ 75 rpm, and change the starch into alpha starch.

After kneading, extrude the semi-processed material in a rod shape, and put it into a doughnut shaped solidifying vessel (32) and store it in the refrigerator (33) at a temperature of 2 ~ 5 °C for 2 ~ 3 days, and harden the semi-processed material.

Subsequently, remove the hardened semi-processed material from the refrigerator (33) and shave the surface with a rice cake shaver (34), then further shave the surface or cut the semi-processed material into the desired shapes with a cutter (12). Dry the semi-processed material that has been cut and made into desired shapes in a dryer (14) until the moisture content becomes 18 ~ 25% (Fig. 7).

Fry this semi-processed material in a frying machine (23) at 200°C, remove the excess oil with a centrifuge (24), lower the temperature with a cooling unit (35), then

after drying, pack them into bags.

As shown in Fig. 8, in case of Execution Example No. 3, put unpolished non-glutinous rice (36) into the rice polishing machine (30), and remove the seed skin.

Put the rice into water washing immersion tank (31), and after draining it, put it into a flour mill (37), then make it into a powdered form.

Next, put 120 Kg of rice powder, 900 g of salt (3), some flavoring (5), and 40% of warm water into a pressurized steam kneader (6) for 3.5 ~ 4 minutes and simultaneously agitate it for 12 ~ 13 minutes by revolving the steamed kneader blades at about 50 ~ 75 rpm, and change the starch into alpha starch, then later pass it through a cooling tank (39). After lowering the temperature to 60 ~ 65°C, extrude it with an extruder (38), and make it into strips by using rolls (40) and make it into the desired shape and size with punchers.

The semi-processed material which has been made into the desired shapes shall be passed through the No. 1 Dryer (14), and dried until the moisture becomes 18 ~ 25%.

The dried semi-processed material shall sit for 15 ~ 24 hours at room temperature in a maturing box (41).

As shown in Fig. 9, dry in No. 2 Dryer (22) until the moisture content becomes 15%.

Next fry this semi-processed material in the frying machine (23), and remove the excess oil in a centrifuge (24), add flavor in a flavor adding machine (27), and pack them after cooling.

Although no drawings are attached, as Execution Example No. 4, in place of wheat, powder of corn, and add powder of other grains, vegetable powder, add powder of seeds, either all or partial, at the ratio of 5 ~ 20%, then mix with water and baking powder, and after making a rice cake like viscous substance by steam heating and kneading in the steam kneader, pass through rolls and make thin sheets, and after drying, crush into pieces about 0.5 cm², and make this the semi-processed material. After drying and roasting this make into flakes.

As regards to Execution Example No. 5, to 100 parts of wheat flour add 50 ~ 150 parts of potato starch, some baking powder, flavoring, water or warm water, conduct cooking (digestion) in steam kneader, then after kneading, make it into a pasty rice cake like substance. After maturation, cut into adequate size pieces, then dry them, and make into semi-processed material.

Later by roasting this in roasting machine, frying it in oil, or after baking it, add flavor by the flavoring

machine. In this way, diced rice cakes and Japanese crackers having flavor and smell like potato chips can be produced.

In Execution Example No. 6, to 25 Kgs of wheat flour, add about 50% of steamed potatoes with the skin on, then add some flavorings and blowing agents and 700 cc of hot water having a temperature of 80°C. Agitate this mixture inside of the steam kneader while injecting steam at about 0.5 atm. pressure, and cook for 5 minutes.

Roll to a thickness of 3 ~ 4 mm with rolls, and after cooling by blowing air, roll onto a pipe, and let it sit for about one day and one night. Subsequently, cut it into thin pieces, dry further until the moisture content is 15 ~ 17%, and use this as a semi-processed material.

Next, dry this semi-processed material at a temperature of about 60°C for 4 ~ 6 hours, and fry it in oil at about 200°C. This will result in diced potato crackers which have smell and taste like a potato.

As Execution Example No. 7, to 120 ~ 180 parts of wheat flour, add 100 parts of "okara" (bean curd refuse) immersed in weak alkaline solution adjusted to about pH 7.5 ~ 8.5, 30 ~ 70 parts of starch, 12 ~ 28 parts of water, and some flavoring and blowing agents, then put them into

steam kneader and digest (cook) by kneading and make a pastry rice cake like substance.

Subsequently make thin 1 ~ 3 mm/mm sheets out of them by passing them through rolls.

After cooling and letting it mature, cut to the specified size and shape and make semi-processed material for diced rice cakes by drying until the moisture is 13 ~ 20%.

Pre-heat this semi-processed material, and either fry them in oil or roast them. Subsequently, add flavor, and the diced rice cake is completed.

(Effect of the Invention).

Since this invention follows the above processes, the main ingredients, auxiliary ingredients and the additives are dispersed uniformly. In addition, since the starch is converted into alpha starch, and the drying is sufficient, it can be preserved for a long period of time as foodstuffs without becoming soft or decaying.

Furthermore, they can be mass produced with comparatively small labor. and light, delicious, crispy snack foodstuffs can be supplied.

CLAIMS

1. Manufacturing method of snack foodstuff semi-processed material for granular foodstuffs containing the starch of rice, barley, wheat, millet, potato, etc. as the main ingredient, and granular or powdered foods containing proteins, starches, beans, sesame, small fishes and shellfishes as the auxiliary ingredients, in addition to such additives as food colorings, blowing agents, spices, flavorings, etc., said foodstuffs being made by adding water or hot water thereto, steaming and kneading them by injecting high-pressure steam while changing the revolutionary frequency (rpm) in accordance with the formulation degree of gluten in the main ingredient, converting the starch into alpha starch and changing the material into a rice cake, then passing it through rolls to make it into sheets, performing their pre-drying, then cutting them or punching them into size and shapes that match the application purpose, and assorting them after main drying.

2. The manufacturing method of snack foodstuffs in which after the main drying in Claim 1, the semi-processed material is further crushed and assorted.
3. Method of manufacturing fried foodstuffs, cracker like foodstuffs by frying in oil, roasting, toasting, coloring, etc. the foodstuff semi-processed material manufactured in accordance with Claim 1.
4. Manufacturing method of semi-processed material of diced rice cake by adding water or hot water to the main ingredients, auxiliary ingredients, and additives shown in Claim 1, and agitating them while injecting high pressure steam, then charging colored granular rice and millet cake stock manufactured by the method described in Claim 2, then continuing steam kneading again, in continuation of method described in Claim 1.
5. Manufacturing method of snack foodstuff semi-processed material for diced rice cake like snacks by using wheat flour as the main ingredient, and adding starch within 20%, and some salt, blowing agent, flavoring, and warm water, then charging them to the steam kneader, and while injecting

high pressure steam, conduct agitation by revolving the blades of the kneader at 180 ~ 300 rpm, subsequently, pass through rolls so that the specified thickness and width can be obtained, then roll up by winding equipment via the chain conveyor, next, dry and let it mature, subsequently, cut or punch out to suitable size and shape, and dry by hot air dryer.

6. Manufacturing method of snack foodstuff semi-processed material in which glutinous rice which has been polished and crushed is put into the steam kneader together with some salt, flavoring and warm water, and while injecting high pressure steam, is agitated by revolving the blades at 50 ~ 75 rpm, and extruded from an extruder which converts the starch into alpha starch which resembles a pasty rice cake, which is put into a solidifying vessel, and left sitting in the refrigerator for a few days, after cooling and solidifying the semi-processed material in the refrigerator for a few days, take it out, arrange the shape, perform cutting, then let it dry so that it will become a semi-processed material with a moisture content of about 20%.

7. Manufacturing method of snack foodstuff semi-processed material in which non-glutinous rice is made into a powder and used as the main ingredient, and put into the steam kneader together with some salt, flavoring, and warm water, and while injecting high pressure steam, the agitation is done by revolving the blades at 50 ~ 75 rpm, after passing it through the cooling vessel, extrude it out and adjust the shape and size by punching out the pieces, then dry them in a dryer, and let it mature in a maturing box, and make the moisture content about 15%.

8. Snack foodstuff manufacturing method in which the powder of other grains, vegetable powder, and powder of seeds either all or partial, are added to corn powder at a ratio of 5 ~ 20%, and mixed together with some baking powder and water, then made into a pasty rice cake like substance by steam heating and kneading in the steam kneader, subsequently it is made into thin sheets by the rolls, and after drying, crushed and made into semi-processed material, after the semi-processed material is dried, it is roasted and made into flakes.

9. Manufacturing method of snack foodstuff in which steamed potatoes with skin is added to wheat flour at a ratio of about 50% together with some flavoring, blowing agent, and hot water, then steam heated and kneaded in the steam kneader, subsequently, the semi-processed material is made into sheets by the rolls, then dried by hot air and left to mature, after it is dried even more, and made into semi-processed material, it is fried in oil at high temperature.

10. Manufacturing method of snack foodstuff in which dried potato powder is mixed with wheat flour at the ratio of 50 ~ 150% together with some baking powder, flavoring, water or hot water, then put into a steam kneader where cooking and kneading are done to make a pasty rice cake like material, subsequently, it is made into sheets and left to mature, after cutting it into suitable sizes and shapes, it is dried to form semi-processed material.

11. Manufacturing method of snack foodstuff in which wheat flour 120 ~ 180%, starch 30 ~ 70%, water 12 ~ 28% and some flavoring, and blowing agent are added to "Okara", Bean curd refuse, which has been immersed in alkaline solution

for several hours, and then put into the steam kneader where they are mixed and cooked, and made into a pasty rice cake like material; subsequently, this is made into sheets, and after cooling and letting it mature, it is cut into specified shapes and sizes, then dried to a moisture content of 12 ~ 13%, and made into semi-processed material.